REMARKS

Claims 1 – 36 and 56 remain active in the application.

The independent claims (1, 2 and 3) have been amended to recite a "second conduit connected to said first conduit at a junction". This language refers to the structure shown in Fig. 6, where the second conduit joins the first at a "T" junction located along the first conduit. In other words, the connection between the first and second conduits is not a linear or sequential arrangement of spaces.

Claims 1 – 36 and 56 stand rejected under 35 USC 112, second paragraph as being indefinite.

Claims 1 and 3: The examiner asserts the direction of fluid flow between the first and second conduits is unclear. These claims recite a "second conduit for retaining a fluid," which indicates that the fluid starts in the second conduit. This interpretation is consistent with pump means for "displacing said fluid from said second conduit to said first conduit".

Claim 4: said to be unclear with regard to nature of the air-liquid interface sensor. A "sensor capable of detecting an air-liquid interface" is clearly described in the specification on page 18, lines 7 – 13, and is preferably a conductivity sensor.

Claim 13 has been clarified by inserting the phrase "selected from the group consisting of" after "closable valve" defining a Markush group.

Claim 29: The term "plurality" has been changed to "one or more". Such a plurality of mechanical and electrical connections is described in on page 12, lines 15 – 17 of the specification.

Claim 34: The use of mobile (magnetic) particles is enabled at page 22, second paragraph.

Claim 1 – 3, 5 – 8, 12 – 21, 30, 31, 34 – 36, and 56 are rejected under 35 USC 102(e) over Kapur et al. (US 6,548,236).

Kapur et al. discloses what is essentially only a microtitre plate with numerous wells. Element 8 at col. 12, lines 46 – 56 merely describes cell binding on a surface and is not an "analyte sensor," as claimed. The only mention of electrodes are for plasma discharge of a gas, and in relation to electokinetic movement of a fluid. Kapur et al. is silent about analyte sensors of any kind, and there are clearly no electrochemical sensors. We are claiming a sensor and not just a cuvette which is interrogated externally.

The examiner asserts that elements 30 and 32 of Kapur et al. meet the present limitations of a first and second conduit. However, in Kapur et al. these elements are attached in linear fashion because 32 is an extension of 30 beyond cell detection region 8. In the present invention the second conduit joins the first at a "T" junction, see Fig 6.

With regard to the limitation of "a valve in said first conduit, wherein said valve is closed by contact with said sample" Kapur et al. is silent. The examiner cites Kapur et al.'s element 500 in fig 36 and col. 20, lines 48-52. The col. 20 reference cannot reasonably be read to mean that a valve is closed *by contact* with a sample. There are two references to element 500 in Kapur et al., the first at col. 12, line 17, in descrubing the figures, states only that it is a check valve. The second at col. 34, line 13 again describes a check valve. The standard engineering definition of a check valve is a device which permits fluid flow in only one direction in a conduit:

> **Valve** \Valve\, n. [L. valva the leaf, fold, or valve of a door:
> cf. F. valve.]
>
> 2. A lid, plug, or cover, applied to an aperture so that by its movement, as by swinging, lifting and falling, sliding, turning, or the like, it will open or close the aperture to permit or prevent passage, as of a fluid.
>
> Note: A valve may act automatically so as to be opened by the effort of a fluid to pass in one direction, and closed by the effort to pass in the other direction, as a clack valve; or it may be opened or closed by hand or by mechanism, as a screw valve, or a slide valve.
>
> -- http://dict.die.net/check%20valve/
>
> Source: *Webster's Revised Unabridged Dictionary (1913)*

This is consistent with Kapur et al.'s usage, see col. 34, lines 20-26, where valves are open when fluid flows but return to a closed position when flow stops.

The Kapur et al. valve does not anticipate the valve of independent claims 2 and 3, which "is closed by contact with said sample". Nor does it anticipate the dry sponge valve and flap valve held open by a soluble compound or polymer of claim 13. As stated at page 6, line 26, we

seek to cover "a valve that closes after contact with a liquid [which] enables one pump means to move both the sample and a second liquid sequentially over the analyte sensor array". Accordingly, the 102 rejection of claims 2 and 3 and those that depend on them should be withdrawn.

With regard to claim 1, its dependent claims, and also independent claim 3, reciting "means for inserting at least one air segment into said first or second conduit", the examiner cites element 740 and col. 20, lines 12-40; col. 31, lines 46-49 and col. 33, line 65 – col. 34, line 11. Kapur et al. defines element 740 as an electrokinetic pump at col. 12, line 25, and it is described starting at col. 28, line 20. The col. 20 citation is silent on air segments of any kind. The col. 31 and col. 33 citations do mention the use of air segments but not in the context of two conduits *joined at a junction*, as claimed, and also not by the specific means of the present claim 12.

The three independent claims (1, 2 and 3) all have the limitation of "pump means capable of displacing said sample from said holding chamber into said first conduit, said pump means further capable of displacing said fluid from said second conduit into said first conduit". The examiner cites element 740 (an electrokinetic pump) and col. 20, lines 12-40. While Kapur et al. does disclose the use of a pump to control fluid flow within a microfluidic device (col. 7, line 64), it does not anticipate the present particular pump means because Kapur do not disclose a pump means which is "capable of displacing said fluid from said second conduit into said first conduit" through a junction, where said "second conduit [is] for retaining a fluid".

In general, the examiner has parsed the claim elements and rejected claims 1-3 as if they read on a cartridge with two conduits, a holding chamber, a sensor, a pump and an air segment and/or valve means, rather than addressing the interrelationships between these elements as a whole. Based on the above, independent claims 1, 2 and 3 are not anticipated by Kapur et al. All other pending claims depend on these.

With regard to plurality of electrodes cited in col. 28, lines 12-40 (and discussed above), these are not sensors used for making a determination, but just electrodes used for electrokinetic fluid actuation.

With regard to a third conduit connecting said second conduit to an overflow chamber of present claim 17, cited as element 300 and at col. 28, lines 37-40, the basis for novelty is in claims 1-3 on which it depends.

Regarding the rejection of claims 13-16, the citation at col. 30, lines 40-65 addresses a waste reservoir filled with a porous medium which serves as a pump. None of claims 13-16 addresses a waste reservoir or the use of porous media in that context.

With regard to a constriction to control fluid flow, cited at col. 26, lines 28-53, this section as well as the entire specification is silent on a constriction.

Regarding claims 30 and 31, the C10 reference does not mention an analyte sensor per se, and the C2 reference is directed to decreasing non-specific binding of cells, not substances as a whole. In any event, these claims should still be allowable based on arguments for claims 1-3 above.

Regarding claims 34-36, the col. 34 reference only mentions a magnetic ball for closing a valve, it does not mention magnetic particles that interact with the analyte and can be localized to a sensor. All references to filter elements in fig 13 of Kapur et al. (and elsewhere) relate to optical filters, not liquid filters capable of catching microparticles.

Claim 4 and 9 stand rejected under 35 USC 103(a) over Kapur et al. in view of Zelin (US 5,821,399). Claims 10 and 11 are rejected as obvious over Kapur et al. in view of Opalsky et al. (US 6,438,498). Claim 22 – 26, 28 – 29 and 32 – 33 are rejected as obvious over Kapur et al. in view of Zier et (US 4,919,141). Claim 27 is rejected as obvious over Kapur et al, Zier et al. and Grundig et al. (US 6,221,238).

Regarding claim 4 and 9 and the examiner's comments on Zelin et al.'s disclosure of air-liquid interfaces, the claims have been amended to stand clear of Kapur et al., and so any combination with Zelin et al. would not result in the present invention.

Regarding claims 10 and 11, concerning the examiner's comments on Opalsky and metering, as amended the combination with Kapur et al would not result in the present invention.

Regarding claim 22-26, 28-29 and 32-33, concerning the examiner's comments on Zier and glucose oxidase, the combination with Kapur et al is moot and would not result in the present invention

On page 7 of the Office Action, the examiner acknowledges that Kapur et al. "fails to teach an analyte sensor being an immunosensor." But the examiner is incorrect in asserting that Zier et al. teaches an immunosensor at col. 4, lines 54-62. The entire Zier et al. application is silent on the use of antibodies for any reason.

Regarding claims 25, 28 and 29, Zier et al. 4-8 does not teach a substrate for an antibody-enzyme conjugate at col. 6, lines.

Regarding claim 27 and the examiner's comments on Zier et al., Grundig et al. and ferrocene, the combinatio is moot as claims 1-3 have been amended to stand clear of Kapur, see above.

CONCLUSION

Applicants submit that the case is now in condition for allowance. Early notification of such action is earnestly solicited.

Applicant believes that no fee is due in connection with this filing. However, the Commissioner is hereby authorized to charge any fees due in connection with this filing to Deposit Account 50-1710 or credit any overpayment to same.

The undersigned attorney may be reached at our Washington, D.C. office by telephone at (202) 625-3500. All correspondence should be directed to our Chicago address given below.

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Date: May 9, 2005

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